Quasonix Ruggedized Handheld Programmer

User Manual

QSX-AC-HHPROG-800N-Y

Quasonix, Inc.
6025 Schumacher Park Dr.
West Chester, OH 45069
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1 Introduction

1.1 Description

This document describes the operation of the Quasonix Ruggedized Handheld Programmer (PDA Utility). The Quasonix Handheld Programmer is designed to facilitate setting transmitters and receivers for operation. With an intuitive touch screen interface, all basic settings are provided to get your transmitter or receiver up and running quickly.

1.1.1 Package Contents

Package contents are described in Table 1.

Table 1: Package Contents

Quantity	Description
1	Quasonix CD
1	Quasonix Handheld Programmer User Manual
1	Nomad™ Ruggedized PDA with Quasonix Utility Application and Battery Preinstalled
1	International Power Adapter
1	USB cable
1	Stylus
1	Stylus Lanyard
2	Screen Protectors
1	Hand Strap
1	Nomad™ Getting Started Guide
1	Nomad™ Getting Started CD
1	Windows Mobile 6

2   Operating Instructions

The Quasonix Handheld Programmer is operated by using the touch screen interface of a ruggedized Nomad™ PDA. Your Handheld Programmer has the Quasonix Utility Application preloaded. This software utility automatically loads when the Handheld Programmer is turned ON.

2.1   Handheld Programmer Keypad Overview

Figure 1 provides a close-up look at the Handheld Programmer keypad.

Figure 1: Handheld Programmer Keypad

2.1.1   Power Key

The Power key allows different operations depending on how it is pressed.

Figure 2: Power Key

- **Press and hold** the Power key to display and activate a countdown timer that will reboot the device.
- **Press and release** the Power key when the countdown timer is activated to display a menu that allows the device to be completely shut down, soft booted, or hard booted.

- **Press** the Power key quickly to put the Handheld Programmer to sleep.

2.1.2   Tab Key

The Tab key allows the user to quickly move through the Quasonix Programmer Utility settings.

Figure 3: Tab Key

2.1.3   Enter Key

The Enter key allows toggling check boxes for settings that are ON or OFF.

Figure 4: Enter Key

2.1.4   Backspace Key

The Backspace key moves the cursor backward to erase data typed on any numeric setting.

Figure 5: Backspace Key

2.1.5   Screen Menu Keys

The Screen Menu keys are used to select the corresponding left and right menu options displayed on the bottom of the Programming screen.
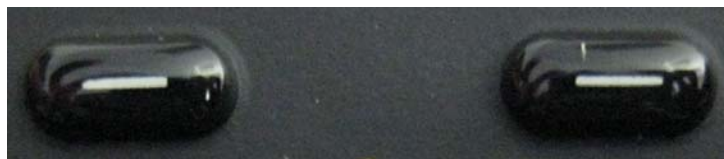
Figure 6: Screen Menu Keys

2.1.6 Numeric Keys

The Numeric keys are used on settings that require a numeric value.

Figure 7: Numeric Keys

2.2 Quasonix Utility Application – Getting Started

1. Connect the Handheld Programmer to a Quasonix transmitter or receiver using a pre-wired MDM-15 wiring harness for TTL units (Part Number: QSX-AC-MDM15-HARNESS-SOCK). Optionally, you can wire your own MDM-15 harness using the prewired MDM-15 with pigtails. (Part Number: QSX-AC-MDM15-36-SOCK). Refer to the documentation that came with your Quasonix transmitter or receiver for the proper wiring harness to use.

Figure 8: MDM-15 Wiring Harness

2. Using the wire harness, plug the female DB-9 connector directly into the bottom of the Handheld Programmer.

3. Power on the Quasonix transmitter or receiver. (Refer to the documentation that came with the transmitter or receiver for the correct voltages and connections.)

   a. If the Handheld Programmer is already powered on and the Quasonix application is running, press the Refresh screen button to automatically attempt to sense the connected device type and acquire settings. The Refresh screen button is located at the bottom of the screen and can be accessed by using the Windows scroll bar found to the right of the screen.

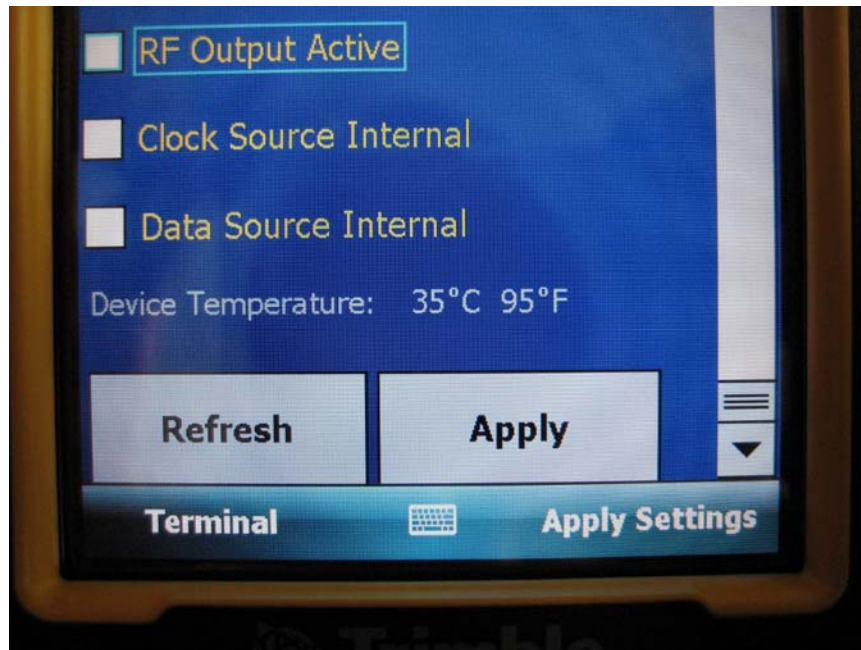**Figure 9: Refresh Screen Button on the Main Menu Screen**

   b. If the Handheld Programmer is not powered on, press the Power button on the keypad.

4. After the Handheld Programmer boots up, it automatically starts the Quasonix Utility Application. The application will try to connect to a device.

The application should display the device type at the top of the Main Menu screen, as shown in Figure 10.
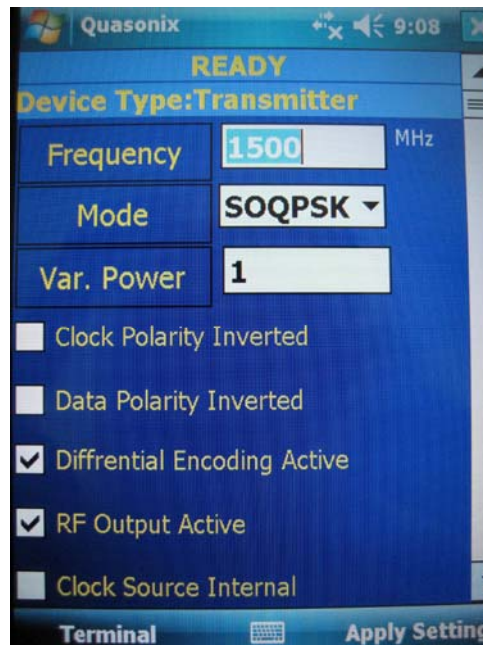
Figure 10: Device Type Display – Transmitter Option

The available Device Types are: Transmitter or Demodulator/Receiver.

If the Device Type displays a value of "Unknown", a communication problem has occurred. Refer to the Troubleshooting section at the end of this manual for assistance.

2.3   Quasonix Utility Application – Main Menu

The Main Menu is where all basic settings can be configured. Depending on the device type, not all settings will be present. For example, receivers do not have RF output so this menu option is hidden. Other menu items, such as Bit Rate B, are also hidden if the device does not support AUQPSK as a mode option and this mode is not actively selected.

When configuring the device, the Apply screen button, shown in Figure 11, or Apply Settings option, shown in Figure 10, must be selected in order for the changes to be applied to the device. Both perform the same function. The Apply Settings option may be used at any time, individually after each setting, or after all settings have been made.

Figure 11: Refresh and Apply Screen Buttons on Settings Screen

The Refresh screen button, allows the devices current configuration settings to be retrieved and displayed. This button also allows for the automatic detection of a new device when multiple devices are to be configured.

After moving the serial connector from one device to another, press the Refresh screen button to establish a new connection and retrieve settings. The Refresh function causes the Handheld Programmer to replace any changes to settings that have been made. Be sure and press the Apply screen button if you do not wish to lose your settings.

Selecting the [×] icon in the upper right corner of the Main Menu closes the application completely. (The application will not be running as a PDA background task.) To run the application after it has been closed, select the following from the Windows Menu option; **Start** – **Programs** – **Quasonix**, then click on the Quasonix application.

2.3.1   Main Menu Settings

The fields on the Main Menu screen, shown in Figure 12, are described in Table 2. Some of the fields described in the table only display when certain Modes are selected.
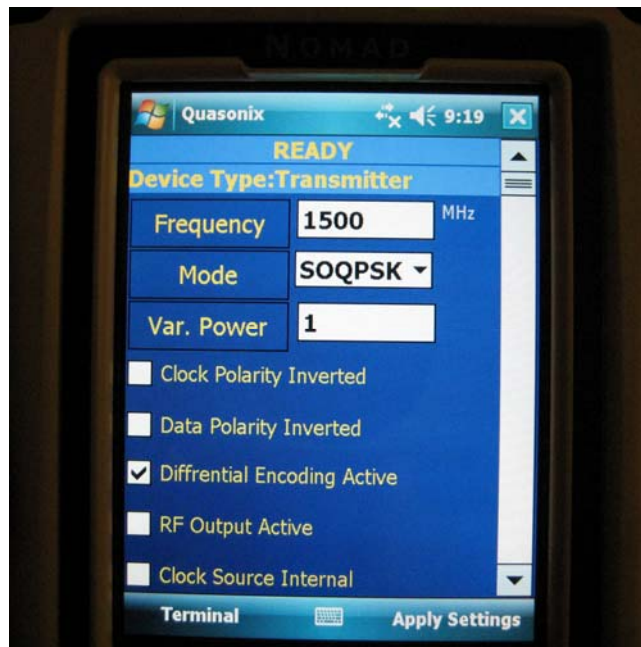
Figure 12: Main Menu Example

Table 2: Main Menu Field Descriptions

Menu Field	Description
Frequency	Frequency units are in MHz.
	If the device is multi band, the frequency ranges for the given bands may be entered into this text box.
	All or part of the frequency may be selected using a stylus or finger to highlight the entry. Use the numeric keypad on the Handheld Programmer to enter the desired frequency.
Mode	Modulation settings.
	Common modulation types are PCMFM and SOQPSK. More modulations types may be available depending on the device settings that were ordered when the Handheld Programmer was purchased.
Bit Rate	Baseband Bit Rate units are Mbps
Bit Rate B	Baseband Bit Rate units are Mbps
	This rate is specific only to the AUQPSK modulation type; no other modes support this feature.
Variable Power	This setting allows fine adjustments to RF power output.
	Variable power is specific only to transmitters. Not all transmitters support this option.
	The default value is 0. Acceptable range is from 0 to 31.

Menu Field	Description
Clock Polarity Inverted	When checked, the clock polarity is inverted. Under normal circumstances the clock polarity is unchecked and not inverted.
Data Polarity Inverted	When checked the data polarity is inverted. Under normal circumstances the data polarity is unchecked and not inverted.
Differential Encoding Active	Differential encoding only applies to the modulation type SOQPSK. The default value is active or checked. When a transmitter is connected differential encoding will be displayed. When a receiver is connected differential decoding will be displayed.
RF Output Active	RF output only applies to transmitters. The default value is checked.
Clock Source Internal	Clock Source Internal only applies to transmitters. When an external clock is not available, setting this option allows the transmitter to source its own clock. The default value is unchecked.
Clock Rate	Clock Rate units are in MHz. Clock Rate only applies to transmitters. Clock Rate is dependent on "Clock Source Internal" being selected. Clock rate configures the internal transmitter's clock. Digitally synthesized internal clock frequency range is 0.150 MHz – 22.0 MHz, in steps of approximately 1424.15 Hz. Exact values available are N * 93.333 / 65536 (in MHz)
Data Source Internal	Data Source only applies to transmitters. When an external data source is not available, setting this option allows the transmitter to source its own data PN pattern. The default value is unchecked.
Data Pattern	Data Pattern units are defined as PN patterns. Data Pattern only applies to transmitters. Patterns may be one of four specified patterns (PN6, PN11, PN15, PN23)
** Device Temperature	Device temperature is displayed in Celsius and Fahrenheit. Use this information to determine proper heat dissipation or overheating of the device.

2.4   Quasonix Utility Application – Terminal

The Terminal Menu is where all advanced settings can be configured. Depending on the device type, not all settings will be available. For example, receivers do not have RF output so this menu option will not be available on the menu help list.

2.4.1   Using the Touch Keyboard

The Terminal window automatically opens a touch keyboard on the screen that can be operated using the PDA stylus.
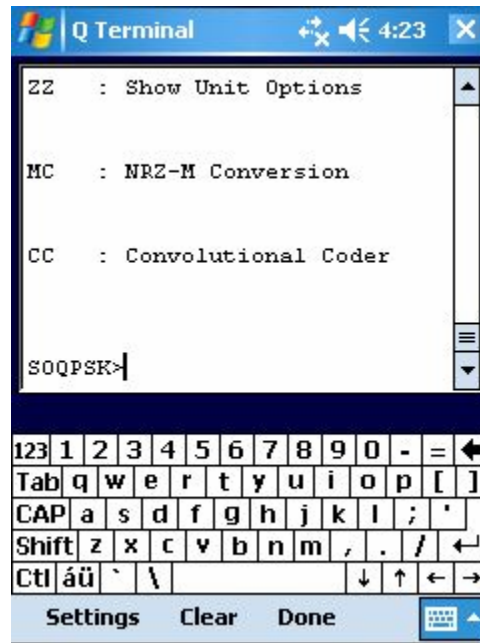
Figure 13: Terminal Window

To display a list of advanced commands available from the terminal window:

- Using the stylus, press the Shift key followed by the "?" key.

The terminal should display a question mark.

- Press the Return key (on the Handheld Programmer keypad) to issue the command to the device.

A list of commands should be displayed in the terminal window.

- Use the scroll bar, located to the right of the terminal, to view any information that may have scrolled off the display screen.

If the question mark or the menu do not display, there may be a communications problem. Refer to the Troubleshooting section for assistance. Refer to the documentation that came with your Quasonix device for a complete list of User Commands. Refer to Tiers 0 / I / II Basic Serial Terminal Commands in this document for examples of User Commands.

2.4.2 Using the Terminal Menu Options

There are three menu options with the Terminal window: Settings, Clear, and Done.
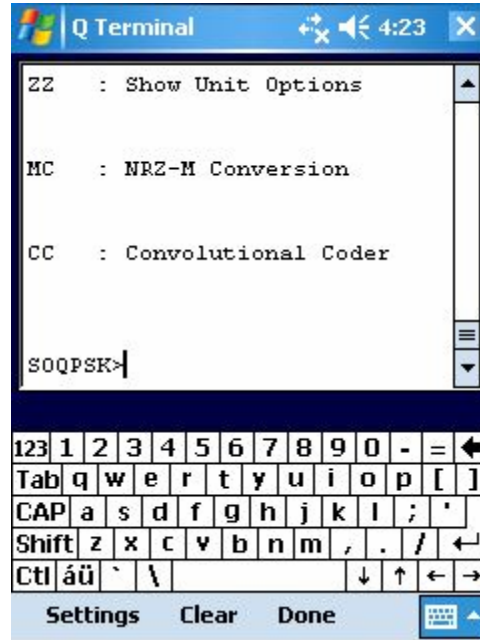
Figure 14: Terminal Menu Options – Settings, Clear, and Done

2.4.2.1 Settings

The terminal interface automatically configures its baud rate settings after discovering the connected device from the Main menu. If you wish to use the terminal to communicate with other devices that support ASCII serial interfacing, use the Settings menu option to configure the serial communications settings. Refer to Serial Port Settings for specifics.

2.4.2.2 Clear

The Clear menu option erases all terminal information currently displayed.

2.4.2.3 Done

The Done menu option causes the application to exit out of the Terminal menu and back to the Main menu.

2.5 Quasonix Utility Application – Serial Port Settings

The Serial Port Settings menu, shown in Figure 15, is used to configure the Handheld Programmer's serial port to communicate with just about any ASCII serial device.

- Select the Baud Rate then full or half duplex based on the device you wish to communicate with.

Data bits, parity bits, and the stop bit are currently fixed at 8/N/1 and cannot be configured.

- After selecting the Baud and Duplex, press the Accept screen button to apply the new communications settings.

- Press the Cancel screen button to abandon any changes to communications settings.

Note: Custom serial port settings are only maintained while in the Terminal menu. Exiting back to the Main menu and pressing the Refresh screen button starts device detection which automatically configures communications settings and causes any serial port changes to be lost.

Figure 15: Serial Port Settings

3   Basic Serial Terminal Commands

Basic serial commands are programmed into the Quasonix PDA Utility. Your transmitter or receiver may have additional commands that are not currently available in the handheld programmer software.

3.1   Tier 0 (PCM/FM), Tier I (SOQPSK-TG), and Tier II (MULTI-H CPM) Commands

Table 3: Tiers 0 / I / II Basic Serial Terminal Commands

Mnemonic	Name	Description
?	Help Message	Displays abbreviated list of available commands
AA	AGC State	Report or set the receiver's automatic gain control (AGC). Examples: AA Report the AGC state AA 0 Set AGC OFF AA 2 Set AGC ON
BM	Bit Rate Measurement	Report bit rate measurement
BR	Bit Rate	Report or set baseband bit rate Examples: BR Report the bit rate setting BR 20 Set bit rate to 5 Mbps BR 0.6 Set bit rate to 600 Kbps
CP	Clock Polarity	Report or set clock polarity inversion state Examples: CP Report the clock source state CP 0 Set clock inversion OFF CP 1 Set clock inversion ON
DP	Data Polarity	Report or set data polarity inversion state Examples: DP Report the polarity inversion state DP 0 Set data inversion OFF DP 1 Set data inversion ON
DS	SDI Status	Report the SDI (System Degradation Indication) status required for the RF Networks 2241 Diversity Branch Selector

Mnemonic	Name	Description
FR	Frequency	Report or set receiver center frequency. Examples: FR Report the frequency setting FR 2200.5 Set modulation to 2200.5 MHz
GO	Start/Restart	Initiate demodulation with current parameters. This command is required when setting both the modulation and the bit rate.
MO	Modulation	Report or set modulation setting. Examples: MO Report the modulation setting MO 0 Set modulation to PCM/FM MO 1 Set modulation to SOQPSK-TG MO 2 Set modulation to Multi-h CPM
PL	Input Power Level	Report current input power level
PS	Show Parameters	Displays all parameters
RE	Restart Demodulator	Restart Demodulator without reconfiguration
RN	Derandomizer State	Report or set the derandomizer state. Examples: RN Report the derandomizer state RN 0 Set the derandomizer OFF RN 1 Set the derandomizer ON
RV	FPGA & Firmware Revision	Report the revision numbers for both the FPGA load and the Firmware load
SC	Saturation Count	Report the saturation count
SQ	Signal Quality	Report the signal quality information
SV	Save Parameters	Saves the current parameters in non-volatile memory, including frequency, modulation, bit rate, data polarity, clock polarity, AGC state, verbosity level, etc.
TH	TRL High Mark	Report or set the TRL high mark, on a scale from 0.0 – 5.0. Examples: TH Report the TRL high mark level TH 0.2 Set the TRL high mark to 0.2 TH 4.9 Set the TRL high mark to 4.9

Mnemonic	Name	Description
TL	TRL Low Mark	Report or set the TRL low mark, on a scale from 0.0 – 5.0. Examples: TL Report the TRL low mark level TL 0.1 Set the TRL low mark to 0.1 TL 3.7 Set the TRL low mark to 3.7
VF	Viterbi Forget Factor	Report or set the Viterbi forget factor, on a scale from 0.01 – 0.99. Examples: VF Report the Viterbi forget factor VF 0.04 Set the Viterbi forget factor to 0.04 VF 0.62 Set the Viterbi forget factor to 0.62
VL	Verbosity Level	Report or set verbosity level, on a scale of 0 – 9. Examples: VL Report the verbosity level VL 0 Set the verbosity level to 0 VL 5 Set the verbosity level to 5
VS	Viterbi Status	Report the Viterbi lock status and strength

3.2   PSK Commands

Table 4: Legacy PSK Basic Serial Commands

Mnemonic	Name	Description
?	Help Message	Displays abbreviated list of available commands
BR	Bit Rate	Report or set baseband bit rate Examples: BR Report the bit rate setting BR 20 Set bit rate to 5 Mbps BR 0.6 Set bit rate to 600 Kbps
BM	Bit rate Measurement	Report bit rate measurement
CP	Clock Polarity	Report or set clock polarity inversion state Examples: CP Report the clock source state CP 0 Set clock inversion OFF CP 1 Set clock inversion ON

Mnemonic	Name	Description
DP	Data Polarity	Report or set data polarity inversion state Examples: DP Report the polarity inversion state DP 0 Set data inversion OFF DP 1 Set data inversion ON
FR	Frequency	Report or set receiver center frequency. Examples: FR Report the frequency setting FR 2200.5 Set modulation to 2200.5 MHz
GO	Start/Restart	Initiate demodulation with current parameters
MO	Modulation	Report or set modulation setting. Examples: MO Report the modulation setting MO 3 Set modulation to BPSK MO 4 Set modulation to QPSK MO 5 Set modulation to AQPSK MO 6 Set modulation to AUQPSK MO 7 Set modulation to OQPSK MO 8 Set modulation to UQPSK MO 9 Set modulation to Digital PM (DPM)
PL	Input Power Level	Report current input power level
RE	Restart Demodulator	Restart Demodulator without reconfiguration
RV	FPGA & Firmware Revision	Report the revision numbers for both the FPGA load and the Firmware load
SC	Saturation Count	Report the saturation count
SV	Save Parameters (Requires NV option)	Saves the current parameters in non-volatile memory, including frequency, modulation, bit rate, data polarity, clock polarity, AGC state, verbosity level, etc.
VL	Verbosity Level	Report or set verbosity level, on a scale of 0 – 9. Examples: VL Report the verbosity level VL 0 Set the verbosity level to 0 VL 5 Set the verbosity level to 5

4   Maintenance Instructions

The Handheld Programmer requires no regular maintenance. There are no serviceable parts.

5   Product Warranty

The Quasonix Handheld Programmer carries a standard parts and labor warranty of one (1) year from the date of delivery.

6   Technical Support and RMA Requests

In the event of a product issue, customers should contact Quasonix via phone (1-513-942-1287) or email (support@quasonix.com) to seek technical support. If the Quasonix representative determines that the product issue must be addressed at Quasonix, a returned materials authorization (RMA) number will be provided for return shipment.

Authorized return shipments must be addressed in the following manner:

Quasonix, Inc.
ATTN: Repair, RMA #
6025 Schumacher Park Drive
West Chester, OH 45069

To ensure that your shipment is processed most efficiently, please include the following information with your product return:

- Ship To – Company name, address, zip code, and internal mail-drop, if applicable

- Attention/Contact person – Name, Title, Department, Phone number, email address

- Purchase Order Number – If applicable

- RMA Number – provided by the Quasonix representative

Please note that Quasonix reserves the right to refuse shipments that arrive without RMA numbers.

7 Troubleshooting

Problem	Solution
Device Type is reporting Unknown on the Main Menu	This message is reported if the Handheld Programmer is turned ON and is running the Quasonix Utility Application without a powered device connected to it. Press the Refresh screen button on the Main menu to attempt to re-establish communication with the device. This message is also reported when a device other than a Quasonix transmitter or receiver is connected. When using the Handheld Programmer to communicate with other serial devices, select "Terminal" on the Main menu. This message may also display when unplugging from one device and connecting to another device. Press the Refresh screen button after connecting to the new device.
Pressing the Refresh screen button on the Main menu still reports Device Type: Unknown.	There may be a physical wiring problem with the serial cable connected to the device. Try connecting the Handheld Programmer to a computer serial port running a terminal program. Be sure to use a null modem cable when connecting a Handheld Programmer to a computer for proper communication. From the Quasonix Utility Application select "Terminal" then "Settings" and configure the communication settings to match the computer's terminal settings. Anything typed in the Quasonix Utility Application should display on the computer's terminal screen and anything typed in the computer screen should display on the Quasonix Utility Application terminal screen. If this is the case, then the Handheld Programmer is functioning correctly and the problem may be in the transmitter or receiver cabling.
Connecting the Handheld Programmer to a computer using the Handheld terminal and a computer terminal was successful. Why does the Device type still report Unknown for the device type when connected to the transmitter or receiver device?	There may be a physical wiring problem with the serial cable connected to the device. Try connecting the transmitter or receiver to a computer serial port running a terminal program. Refer to your device's documentation for the correct baud rate. Common settings are 57600 8/N/1 and 115200 8/N/1. If you can communicate with the transmitter or receiver, make note of the device's baud settings and attempt the connection using the Quasonix Handheld Programmer terminal with the same baud rate settings.
The Handheld Programmer communicates with the transmitter or receiver using the Quasonix Utility Application terminal and selected baud settings Why does the Device type still report Unknown for the device type?	Make sure the transmitter or receiver is a Quasonix device. If the device is a Quasonix transmitter or receiver, it may too old to use the binary interface which allows the Main menu to operate. If so, the terminal dialog on the Quasonix Utility Application may still be used to configure these devices. Please refer to section 3.0 Basic Serial Commands for setting older devices.

8   Appendix A – Acronym List

Acronym	Description
AGC	Automatic Gain Control
AM	Amplitude Modulation
AQPSK	Variant of Quadrature Phase Shift Keying
ASCII	American Standard Code for Information Interchange
AUQPSK	Variant of Quadrature Phase Shift Keying
BPSK	Binary Phase Shift Keying
CD	Compact Disk
DB-9	D-subminiature 9 pin Serial Connector
DHCP	Dynamic Host Configuration Protocol
DPM	Digital Phase Modulation
FEC	Forward Error Correction
FPGA	Field Programmable Gate Array
IF	Intermediate Frequency
IP	Internet Protocol
kbps	Kilobits per second
KHz	Kilohertz
LSB	Least Significant Bit
mbps	Megabits per second
MHCPM	multi-h Continuous Phase Modulation
MHz	Megahertz
OQPSK	Offset Quadrature Phase Shift Keying
PCMFM	Pulse Code Modulation/Frequency Modulation
PDA	Personal Device Assistant
PN	Pattern Number
QPSK	Offset Quadrature Phase Shift Keying
RDMS	Receiver DeModulator Synchronizer
RF	Radio Frequency
RX	Receive

Acronym	Description
SDI	System Degradation Indication
SOQPSK	Shaped Offset Quadrature Phase Shift Keying
SOQPSK-TG	Shaped Offset Quadrature Phase Shift Keying –Telemetry Group
TRL	Tracking Loop
TTL	Transistor Transistor Logic
TX	Transmit